Karlsruher Institut für Technologie

KNMF Karlsruhe NANO MICRO Facility

Injection Moulding for Nano- and Microfabrication

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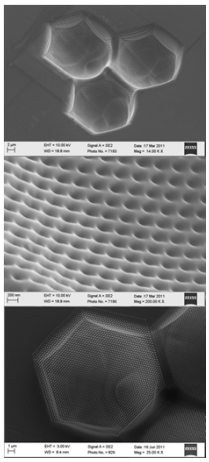
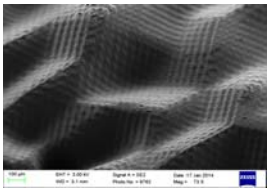
Technological Benefits

- Injection moulding offers decisive advantages for nano- and micro-manufacturing:
  - a wide range of processible polymers, metals, and ceramics
  - very high economic efficiency in medium/large-scale fabrication
  - complex shaped 3D parts (singular items or nanostructured bodies)
  - a large diversity provided by sophisticated sub-variants

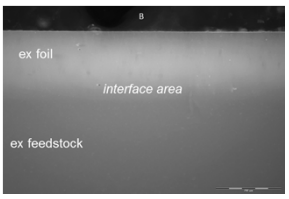


Projects

- Establishing the nano-size area of replication :
  Ommatidia (moth-eye) structures; mould inserts made by Focused Ion Beam (FIB)
  Replication by both injection moulding and injection compression moulding
  User: Cardiff University

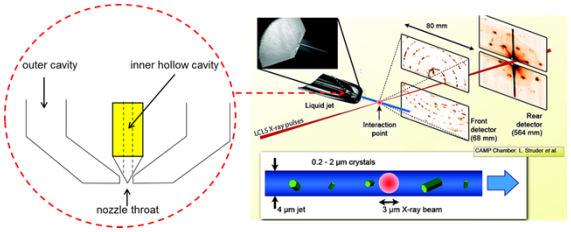


- Polymeric Fractal Scaffolds in Biotechnology
  Use of fractal surfaces for improved cell motility and controlled growth.
  Replicative process enabled identical parts thus statistically reliable results
  User: Universidad Politecnica de Madrid



- Processing of nanopowders by Micro Inmould-labelling to enhance PIM towards nano-manufacturing: nanopowder-filled tapes + PIM feedstocks + co-sintering
  Users: CEA, SVEREA, Fraunhofer IKTS, Keranor

- Collaborative project with **DESY**:
  Liquid jet nozzles for CFEL (European X-ray free-electron laser)

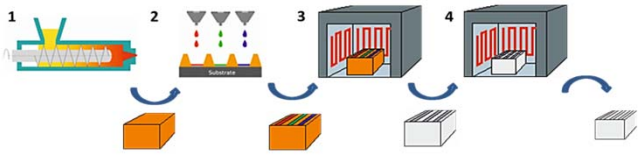


Outlook

- Increased application of multi-material process variants

- Hybridization of processing technologies
  e.g. PIM + Additive Manufacturing

1. Micro PIM
2. 3D inkjet printing
3. Debinding
4. Sintering



- Offer the whole range from prototyping up to very large-scale production using polymers, metals, and ceramics

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